

REPORT OF FINAL ASSIGMENT

PLANT DESIGN OF GYPSUM

USING LIMESTONE AND SULFURIC ACID

WITH CAPACITY 150,000 TONS/YEAR



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PAGE OF LEGALIZATION

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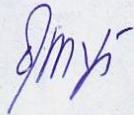
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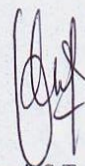
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DECLARATION

I hereby declare that in this report of final project there are no worked ever submitted for a degree at a college and to the best of my knowledge there is no work or opinion ever written or published by any other person, except in writing referred to in the manuscript and mentioned in the list library.

If later there is proved untruth in my statement above, then I will be fully accountable.

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ABSTRACT

Gypsum demand in Indonesia came from domestic production and imported from abroad. But gypsum production in this country is still not sufficient to gain the demand of gypsum in Indonesia. This happen because the increasing of physical development in Indonesia like the demand for cement including wallboard as building material because gypsum is the raw material in the manufacturing of cement and the main ingredient of wallboard. So that, with the establishment of gypsum industry plant in Indonesia with a capacity 150,000 ton/year can fulfil the demand of gypsum in Indonesia and make income to Indonesia.

In this plant design, gypsum obtained from limestone is reacted with dilute sulfuric acid 50% of weight in in Tubular Tank Reactor (RATB). The operation condition of reactor at 95 °C of tempertature and pressure at 1 atm. the operating conditions of temperature at 95 °C and pressure at 1 atm with weight ratio between the limestone and sulfuric acid entering the reactor is 1:1 in kilograms and conversion is 90% at 0.589 as a residence of time reaction. Production of gypsum (92%) as 18,939.394 kg/hours needs raw material limestone as 11, 324.314 kg/hours and 10,348.097 kg/hours of water. The resulting product from reactor then inserted into a separator and resize equipment's to remove its impurity and obtained the same size of product such as rotary drum vacuum filter, rotary dryer, ball mill and vibrating screen.

The utility unit obtainend water river as 128,088.869 kg/hours that consist of process water preparation as 28,767.535 kg/hours, cooling water as 86,138.751 kg/hours, steam bolier feed as 1,311.059 and water for sanitation 227.084 kg/hours. Demand of electricity as 1,490 kW obtained from PLN and generator set as a supporting equipment. This plant is planed at Indarung city 2020 year with large of area 50,000 m² and need 220 of employee's

Plant of gypsum used fix capital invesment Rp 1,194,144,151,670.040 and manufacturing cost as Rp 740,273,364,660.05. From economic analysis this plant shows profit before and after tax is Rp 780,529,055,232 and Rp 546,370,338,662. Return on Investment (ROI) before and after tax is 65% and 46%. Pay Out Time (POT) before and after tax during 1.33 year and 1.79 yaer. Break Even Point (BEP) as 49.97%, Shut Down Point (SDP) as 34.48%, Internal Ret Return (i) from Discounted Cash Flow (DCF) equation obtained as 43%. According to the economic analysis we can resume that this plant is appropriate to esthablished.

PREFACE

Assalamu'alaikum Wr. Wb.

Praise be to Allah SWT presence over the abundance of grace, taufik and hidayah so that authors can complete the assignmnet report of plant design with the title "Preliminary Plant Design of Gypsum Using Limestone and Sulfuric Acid with Capacity 150,000 tons/year", so well.

The assignment of this plant design is the final task that have to be completed by every student of chemical engineering department at faculty of engineering Universitas Muhammadiyah Surakarta as a prerequisite to complete the undergraduate degree. With this assignment, it is hoped that the ability of reasoning and application of the theories that have been obtained during the lecture can develop and be well understood.

The preparation of this report will not go smoothly without the assistance of the parties concerned. Therefore, the authors would like to thank the following:

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The authors are aware of the limitations in the preparation of this report of plant design assignmnet. Great expectation from authors that will have suggestions and constructive criticism for the perfection of this report. The authors hope that this report will be useful for all readers.

Wassalamu'alaikum Wr. Wb.

Authors

()

MOTTO

*“Allah meninggikan orang-orang yang beriman diantara kamu dan orang-orang yang diberi ilmu pengetahuan beberapa derajat”
(Q.S. Al-Mujadalah: 11)*

*“Sesungguhnya Allah tidak akan merubah nasib suatu kaum sehingga mereka merubah nasib mereka sendiri”
(QS : 13. 11)*

*“Ketika kau dilahirkan ke dunia, kau menangis sedangkan orang di sekelilingmu tertawa, maka buatlah ketika kau meninggal kau tersenyum, sedangkan orang di sekelilingmu menangis”
(Sayyidina Ali bin Tholib ra)*

*“Pengetahuan adalah warisan yang mulia, budi pekerti ibarat pakaian yang baru dan pikiran ibarat cermin yang bening (jernih)”
(Khalifah Ali bin Abi Thalib)*

“Keberanian dan rasa takut adalah dua rahmat yang saling melengkapi. Engkau tak akan tumbuh tanpa keberanian, dan engkau tak akan selamat tanpa rasa takut. Maka, beranikanlah dirimu, saat engkau merasa takut. Tapi, belajarlilah untuk merasa takut, saat engkau merasa berani”

*“Kesalahan masalah lalu adalah pelajaran untuk masa depan yang lebih baik”
(Tryas Munarsyah)*

DEDICATION

*Karya ini kupersembahkan Kepada Allah SWT
Semoga Engkau terima sebagai amal sholeh
Hingga setiap kemudahan menambah kesyukuran
Dan setiap kesukaran menjadi penghapus dosa.*

*Sosok yang pertama yang melukiskan corak dalam lembar hidupku,
Ibu, Ibu, Ibu serta Bapak tercinta, terima kasih atas kasih sayang,
pengorbanan dan pendidikan yang telah diberikan selama ini. Hanya do'a
dan bakti yang dapat aku beri untuk membalas kasih sayangmu. Mohon maaf
jika proses ini begitu panjang, semoga bisa jadi pembelajaran untuk
kehidupan selanjutnya.*

*Saudara/i ku tercinta yang selalu memberiku semangat dan dorongan, terima
kasih atas do'a, kasih sayang, pengorbanan, dan kesabarannya selama ini,
karena kalianlah aku bisa kuat untuk menyelesaikan ini semua.*

*Para dosen yang dengan tulus dan sabar membimbingku meski tingkah ini yang
kadang tidak konsisten dan selalu menunda-nunda kedaaan. Terimakasih dalam
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CONTENTS

PAGE OF TITLE	i
PAGE OF LEGALIZATION	ii
PAGE OF DECLARATION.....	iii
ABSTRACT.....	iv
PREFACE.....	v
MOTTO.....	vi
DEDICATION.....	vii
CONTENTS.....	viii
LIST OF TABLE.....	xiv
LIST OF FIGURE.....	xvi
CHAPTER I INTRODUCTION.....	1
1.1. Background of Plant Design.....	1
1.2. Selection of Plant Capacity.....	2
1.2.1. Projection Demand of Gypsum.....	2
1.2.2. The Price Comparation.....	4
1.2.3. Available of Raw Material.....	4
1.3. Selection of Plant Location.....	5
1.3.1. Primary Factor's.....	5
1.3.2. Secondary Factor's.....	6
1.4. The Process Selection,,.....	7
1.4.1. Kind of Process.....	7
1.4.2. Product Uses.....	9
1.5. Theory Description.....	9
1.5.1. Physical and Chemical Properties.....	9
1.5.2. General Description Process.....	11
CHAPTER II. PROCESS DESCRIPRTION.....	12
2.1. Spesification of Material.....	12
2.1.1. Raw Material.....	12
2.1.2. Product.....	13
2.2. Process Concept.....	14

2.2.1.	Basic of Reaction.....	14
2.2.2.	Operation Condition.....	14
2.2.3.	Reaction Mechanism.....	14
2.3.	Thermodynamic Overview.....	15
2.4.	Kinetic Overview.....	17
2.5.	Step Process.....	18
2.5.1.	Step of Material Preparation.....	18
2.5.2.	Step of Product Formation.....	19
2.5.3.	Step of Product Separation and Purification.....	19
2.5.4.	Packaging.....	20
2.6.	Mass and Heat Balance.....	23
2.6.1.	Mass Balance.....	23
2.6.2.	Heat Balance.....	26
2.7.	Layout of Plant and Equipment.....	31
2.7.1.	Layout of Plant.....	31
2.7.2.	Layout of Equipment.....	34
CHAPTER III. EQUIPMENT SPESIFICATION.....		37
3.1.	Main Equipment.....	37
3.1.1.	Mixer-01.....	37
3.1.2.	Mixer-02.....	38
3.1.3.	Reactor.....	39
3.1.4.	Absober.....	41
3.1.5.	Rotary Drum Vacuum Filter.....	41
3.1.6.	Rotary Dryer.....	42
3.1.7.	Ball Mill.....	43
3.1.8.	Vibarting Screen.....	43
3.2.	Supporting Equipment.....	44
3.2.1.	Silo Tank-01.....	44
3.2.2.	Tank H ₂ O ₄	45
3.2.3.	Tank H ₂ O.....	46
3.2.4.	Screw Conveyor.....	46
3.2.5.	Bucket Elevator-01.....	47

3.2.6. Hopper-.....	48
3.2.7. Bucket Elevator-02.....	48
3.2.8. Silo Tank-02.....	49
3.2.9. Heat Exchanger-01.....	50
3.2.10. Heat Exchanger-02.....	51
3.2.11. Cooler.....	52
3.2.12. Blower.....	53
3.2.13. Pump.....	54
CHAPTER IV UTILITY AND LABORATORY.....	60
4.1. Utility.....	60
4.1.1. Utility Water Supply and Proces.....	60
4.1.1.1. Unit Water Supply.....	60
4.1.1.2. Water Treatment Unit.....	63
4.1.1.3. Untility Equipment Spesification.....	67
4.1.1.4. Pump Equipment.....	83
4.1.1.5. Demand of Water.....	96
4.1.2. Unit Supplying of Steam.....	98
4.1.3. Unit Supplying Electricity.....	99
4.1.3.1. Electrical Power of Process Demand and Utility..	100
4.1.3.2. Electrical Power of Ligthting.....	101
4.1.3.3. Electrical Power of Air Conditioner (AC).....	103
4.1.3.4. Electrical Power of Laboratory and Instrument....	103
4.1.4. Unit Supplying of Air Compressed.....	104
4.1.5. Unit Supplying of Fuel.....	105
4.1.6. Unit of Waste Treatment.....	106
4.1.6.1. Liquid Waste Material.....	106
4.1.6.2. Solid Waste Material from RDVF.....	106
4.2. Laboratory.....	106
4.2.1. The Occupation of Laboratory.....	107
4.2.1.1. Monitoring Laboratory.....	108
4.2.1.2. X-Ray Diffractometer (XRD).....	108
4.2.1.3. Anlyze Water Content.....	108

4.2.1.4. Spectrometry.....	108
4.2.2. Laboratory of Water Analysis.....	109
4.2.3. Laboratory of Research.....	109
CHAPTER V PLANT MANAGEMENT.....	110
5.1. Type of Plant.....	110
5.2. Organizational Sturcture.....	111
5.3. Duties and Power.....	114
5.3.1. Deed Holder.....	114
5.3.2. Board of Commiciners.....	114
5.3.3. Board of Directure.....	114
5.3.4. Expert Staff.....	115
5.3.5. Research and Development (R & D).....	115
5.3.6. Head of Departement.....	116
5.3.6.1. Head of Production.....	116
5.3.6.2. Head of Engineering Departement.....	117
5.3.6.3. Head of Finance.....	117
5.3.6.4. Head of Marketing Departement.....	118
5.3.6.5. Head of General Affairs.....	118
5.3.7. Head of Section.....	119
5.4. Distribution of Work Time Employee.....	119
5.4.1. Non Shift Employee.....	119
5.4.2. Shift Employee/Ploog.....	120
5.5. Employee Status and Wage System.....	121
5.5.1. Stationary Employee.....	121
5.5.2. Daily Employee.....	121
5.5.3. Employe Volume.....	121
5.6. Job Position, Ammount of Employee, and Salaries.....	122
5.7. Employee Social Welfare.....	123
5.7.1. Allowance.....	123
5.7.2. Holiday.....	123
5.7.3. Workwear.....	123
5.7.4. Medical Treatment.....	123

5.7.5. Employee Insurance.....	124
5.8. Occupational Safety and Health.....	124
5.8.1. Project Helmet.....	124
5.8.2. Eye Protection.....	125
5.8.3. Body Armor.....	125
5.8.4. Hand Protection.....	125
5.8.5. Foot Protector.....	125
5.8.6. Respiratory Protection.....	125
5.8.7. Ear Shield.....	125
CHAPTER VI ECONOMIC ANALYSIS.....	126
6.1. Estimation Equipment Cost.....	126
6.2. Base Calculation.....	128
6.2.1. Capacity of Production.....	128
6.2.2. Demand and Price of Raw Material and Product	128
6.3. Cost of Calculation.....	128
6.3.1. Capital Investment.....	128
6.3.2. Manufacturing Cost.....	129
6.3.3. General Cost.....	129
6.3.4. Eligibility Analysis.....	129
6.4. Result of Calculation.....	131
6.4.1. Fixed Capital Invesment.....	131
6.4.1.1. Physical Plant Cost.....	131
6.4.1.2. Engineering Cost and Contruction.....	138
6.4.1.3. Direct Plant Cost (DPC).....	138
6.4.1.4. Contractor Fee and Contingency.....	138
6.4.2. Manufacturing Cost.....	139
6.4.2.1. Direct Manufacturing Cost.....	139
6.4.2.2. Indirect Manufacturing Cost.....	141
6.4.2.3. Fixed Manufacturing Cost.....	141
6.4.3. Working Capital Invesment.....	142
6.4.3.1. Preparation of Raw Material.....	142
6.4.3.2. Raw Material in Process.....	142

6.4.3.3. Saving of Production.....	142
6.4.3.4. Cost Before Selling.....	142
6.4.3.5. Saving of Money.....	142
6.4.4. General Expanse.....	142
6.4.4.1. Administration.....	142
6.4.4.2. Marketing.....	142
6.4.4.3. Finance.....	142
6.4.4.4. Research.....	142
6.4.5. Total Cost of Production.....	142
6.4.6. Cost of Selling Product.....	142
6.5. Economic Analysis	143
6.5.1. Profit of Plant.....	143
6.5.2. Return of Invesment (ROI).....	143
6.5.3. Pay Out Time (POT).....	143
6.5.4. Break Event Point (BEP).....	143
6.5.5. Shut Down Point (SDP).....	144
6.5.6. Discounted Cash Flow (DCF)	144
CHAPTER VII CONCLUSION.....	145
REFERENCES	
STREAM CHART OF PLANT DESIGN OF GYPSUM	
APPENDIX	

LIST OF TABLE

Table 1.1.	The Import of Gypsum Demand in Indonesia.....	2
Table 1.2.	Plant of Gypsum Operated in Indonesia.....	4
Table 1.3.	Price of Raw Material and Product in Market.....	4
Table 1.4.	Selection Process Based Technical and Economic Aspects.....	8
Table 2.1.	The Value of Molecular Weight and ΔH_f Each Component.....	15
Table 2.2.	Gibbs Energy of Raw Materials and Products_Component.....	16
Table 2.3.	Total Mass Balance.....	23
Table 2.4.	Mass Balance in Mixer-01.....	23
Table 2.5.	Mass Balance in Mixer -02.....	24
Table 2.6.	Mass Balance in Reactor.....	24
Table 2.7.	Mass Balance in Absorber.....	24
Table 2.8.	Mass Balance in Rotary Drum Filter.....	25
Table 2.9.	Mass Balance in Rotary Dryer.....	25
Table 2.10.	Mass Balance in Ball Mill.....	26
Table 2.11.	Mass Balance in Vibrating Screen.....	26
Table 2.12.	Heat Balance in Mixer-01.....	27
Table 2.13.	Heat Balance in Mixer-02.....	27
Table 2.14.	Heat Balance in Reactor	28
Table 2.15.	Heat Balance in Adsorber.....	28
Table 2.16.	Heat Balance in Rotary Drum Vacuum Filter.....	29
Table 2.17.	Heat Balance in Rotray Dryer.....	29
Table 2.18.	Heat Balance in Ball Mill.....	30
Table 2.19.	Heat Balance in Vibrating Screen.....	30
Table 2.20.	Heat Balance in Heat Exchanger-01.....	31
Table 2.21.	Heat Balance in Heat Exchanger-02.....	31
Table 2.22.	Heat Balance in Cooler.....	32
Table 2.23.	Large Area of Plant Building.....	33
Table 4.1	Demand of Cooling Water.....	96
Table 4.2	Demand of Steam.....	97
Table 4.3.	Demand of Sanitation Water.....	98

Table 4.4a	Demand of Elctrical Power of Process.....	100
Table 4.4b	Demand of Elctrical Power of Utility.....	100
Table 4.5	Demand of Electrical Power of Lighting.....	102
Table 4.6	Total Demand Electricity Power of Plant.....	103
Table 4.7.	Analysis Procedure of Process Unit.....	108
Table 5.1	Sechedule of Distribution Groups of Shift Employees.....	120
Table 5.2	Clasifiction of Position, Qualaification, Ammount and Salaries of Employee.....	122
Table 6.1	Cost Index of Equipment.....	126
Table 6.2	Cost Main Equipment.....	131
Table 6.3.	Cost Supporting Equipment.....	132
Table 6.4.	Total Cost of Unit Process.....	132
Table 6.5.	Equipment Maked in Placed.....	134
Table 6.6.	Water Treatment Equipment.....	134
Table 6.7	Cost of Pump Water Treatment.....	135
Table 6.8.	Cost of Solar Fuel Tank.....	135
Table 6.9.	Total Cost of Utility Unit.....	136
Table 6.10.	Cost of Building.....	137
Table 6.11.	Cost of Raw Material.....	139
Table 6.12.	Salary of Employee.....	139
Table 6.13.	Cost of Product.....	140
Table 6.14.	Cost of Utitlity and Waste Treatment Unit Equipment.....	141

LIST OF FIGURE

Figure 1.1.	Import of Import Gypsum Demand in Indonesia.....	3
Figure 1.2.	Map of Indarung City, Padang.....	7
Figure 2.1.	Shringking Spherical Particle	17
Figure 2.2.	Qualitative Flow Chart	21
Figure 2.3.	Quantitative Flow Chart.....	22
Figure 2.4.	Layout of Plant Area.....	34
Figure 2.5.	Layout of Main Process Equipment.....	36
Figure 4.1.	Flow Chart of Water Treatment Process.....	66
Figure 5.1.	Flow Diagram of Plant Management of Organization.....	113
Figure 6.1.	Chemical Cost Index.....	127
Figure 6.2.	Economic Analysis Index.....	144